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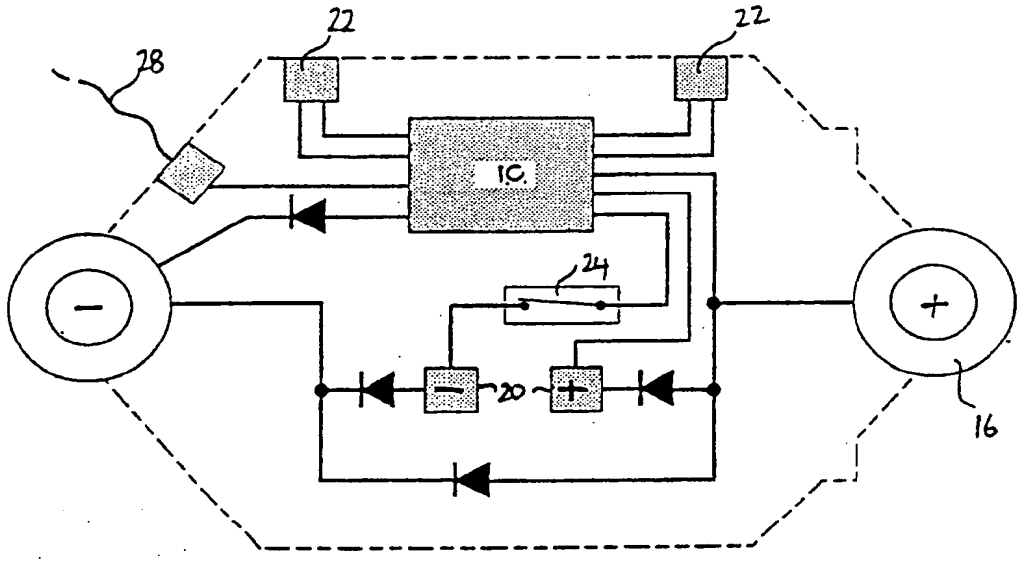

(57) Abstract

A lure for attracting a marine predator, the lure comprising: transducer means (22) for generating a signal attractive to the marine predator. Also, a method of attracting a marine predator including generating a signal representative of sick, injured or distressed prey of the marine predator.

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"LURE"

FIELD OF THE INVENTION

This invention relates to a lure.

This invention has particular, but not exclusive, application as a trolled lure for catching predatory fish.

However, it will be appreciated that the lure in accordance with this invention may be used to attract fish, crustacae and other marine creatures which can be hooked, netted, or otherwise trapped.

As used herein the term "marine predator" includes marine creatures that can be attracted by visual and/or vibratory and/or electrical and/or other sensory signals. As such it will be appreciated that the term includes carnivores and creatures which, strictly speaking, are scavengers or herbivores.

BACKGROUND ART

It is known for trolled lures to exhibit erratic swimming movement as they are drawn through the water and to include reflective surfaces to attract predatory fish and entice the fish to strike the lure.

It is also known for trolled lures to include noise or light generating devices as is exemplified by US patent 4 960 437 in the name of Watson et al, US patent 4 805 339 in the name of Fuentes et al, and US patent 4 819 361 in the name of Boharski.

DISCLOSURE OF THE INVENTION

This invention in one aspect resides broadly in a lure for attracting a marine predator, the lure comprising:-

a housing; and

transducer means for generating a signal attractive to the marine predator.

The signal may be repetitive or sequential and may be visual and/or vibratory and/or electrical and/or any other sensory signal or combination of signals. In this regard it is now known that many predators hunt by detecting the electrical signature of their prey. The signal may be a digitised recording of the electrical signature of prey of the marine predator.

In a preferred embodiment the lure emits a plurality of compatible signals (eg vibration and electrical) via a plurality of transducer means.

In one embodiment, the signal replicates the electrical signature of a bait, preferably a sick or distressed bait. Alternatively, the electrical signal may be representative of the feeeding of other predators. The electrical signal may be generated by the provision of a plurality of electrodes on the outer surface of the lure. The electrodes may be located along the lateral line of the housing of the lure. In embodiments which include an outer lure member which mounts on the housing of the lure to alter the outward appearance of the lure, the electrodes or other transducers are preferably mounted on the outer surface of the lure member to facilitate transmission of the signal.

In another embodiment, the signal may include lights or colour sequencing which may be generated by incorporating selected chemical substances proximate the outer surface of the lure, the chemical substances developing a characteristic colour on the application thereto of an electrical potential or other stimulus. For example, the substance may be luminescent or phosphorescent.

In cases where the signal includes a vibratory component, the vibrations may be amplified by the provision of a resonating or focussing chamber. In the preferred embodiment, the vibratory signal is generated by a piezoelectric element. The vibratory signal may be representative of a bait, preferably a sick or distressed bait. Alternatively, the vibratory signal may be

representative of other feeding predators.

Preferably, the lure further comprises electrical storage means for powering the transducer means and for powering a CPU which controls the transducer means. THe CPU may be included in a microchip on a cicuit board.

In one embodiment the electrical storage means is permanently sealed and rechargeable. This is desirable because non-rechargeable electrical storage means must be periodically replaced and accordingly the lure requires complex sealing to prevent ingress of water.

The lure may comprise photovoltaic cells for recharging the electrical storage means. Alternatively, the lure may include receiving means for receiving power from an external charger for recharging the electrical storage means. The external charger may include photovoltaic cells or may be powered by AC or DC power.

In the embodiment wherein the lure includes receiving means it is preferred that the lure includes suppression means for suppressing generation of the signal when the rechargeable electrical storage means is being recharged. This may be achieved by providing the lure with a reed switch, the reed switch being activated by, for example, a magnet disposed in the external charger. Thus when the lure is being recharged, generation of the signal is suppressed. When the lure is removed from the recharger, the transducer is automatically re-activated.

Preferably, the lure further comprises generator means for powering the transducer means or charging the electrical storage means as the lure moves relative to surrounding fluid. The generator means may also be used to drive planing surfaces on the lure to control the ascent or descent of the lure. The control may be cyclic whereby the lure alternately ascends and descends through a range of depths.

Preferably, the generator means includes an electrically conductive coil and magnetic field means mounted for movement relative to the electrically

conductive coil. The generator means may be a rotary generator which includes propeller means. Alternatively, the generator means may be a reciprocative generator which includes rudder means.

Preferably, the lure comprises fluid inlet means for entry of surrounding fluid into the lure and fluid outlet means for exit of said fluid, the lure further comprising valving means for selectively controlling the flow of fluid through the lure. It is preferred that the fluid inlet means is located adjacent a leading portion of the lure and the fluid outlet means is located rearwardly of the leading portion. In one embodiment the valving means periodically allows pulses of water to exit the fluid outlet means, said pulses replicating the tail beat of a fish, for example. In another arrangement the lure further comprises variable volume fluid storage means, for example bellows, intermediate the fluid inlet means and fluid outlet means and wherein the valving means is operable to selectively charge and discharge the variable volume fluid storage means.

Preferably, the lure further comprises a lure member adapted to be mounted on the housing to thereby alter the outward appearance of the lure. It is preferred that the lure member resembles prey of the marine predator (eg a prawn, fish or frog). The lure members are preferably flexible and resilient to simulate the correct "feel" in the marine predator's mouth as it strikes. A plurality of lure members may be provided and can be interchangably mounted on the housing. In this embodiment the lure member acts to change the outward appearance of the lure and the transducer means generates signals attractive to marine predators. The lure member may include a conductive member adapted to act as an antenna and may include the transducer means or supplementary transducer means.

Preferably, the transducer means is capable of generating a plurality of different signals, each signal corresponding to a different lure member. That is, a

prawn-shaped lure member may be mounted on the housing and the tranducer means switched to produce vibratory and/or electrical and/or other signals indicative of a prawn. Alternatively, the generated signals may be indicative of predators feeding on prawns. If the prawn-shaped lure member proves unsuccessful in attracting strikes, the lure member may be replaced with a bait-fish shaped lure member and the transducer means switched to generate appropriate compatible signals representative of the bait fish.

The signals generated need not be necessarily compatible with the appearance of the lure member. For example, the lure may be successful in attracting strikes when the signal generated and outward appearance are inconsistent.

Preferably, the lure further comprises data storage means for storing data representative of different signals generated by the transducer means. For example, the data may be representative of the electrical and vibratory signals of a plurality of different baits and/or the electrical and vibratory signals of a feeding predator. The data may include digitised recordings of prey of the marine predator.

The lure may also comprise motion control means for altering the swimming action of the lure. The lure may include planing surfaces which can be selectively varied. For example, the lure may include a pivotably mounted bib, the angular range of motion of the bib being variable to alter the swimming action of the lure. Alternatively, the lure may include controlled planing surfaces in the shape of fins or rudders to control the swimming action of the lure.

The transducer means may be switchable between different modes wherein different signals are generated. It is preferred that the transducer means may be remotely switched between modes.

The lure may further comprise a central processing unit for controlling the transducer means. It is

preferred that the data storage means and central processing unit are embodied as a microchip on an IC board. The microchip may control a range of functions of the lure. For example the microchip may control the depth of the lure via control of planing surfaces. A pressure transducer may be included to give feedback in relation to the present depth of the lure. The microchip may also control the signal or signals being generated by the lure. Similarly, the swimming action of the lure may be controlled by the microchip or the lure may be steered.

As noted above, the microchip, and hence the lure, is preferably remotely controllable. That is, the microchip can receive signals from the boat or fisherperson via antenna means. In one embodiment the antenna means is a loop antenna, the loop antenna being strongly constructed and used to mount hooks and/or the trace. The loop antenna may also be used in fixing the lure member to the lure housing. In one arrangement the lure member also includes a conductive member which acts as an supplementary antenna to enhance receptive characteristics.

In an alternative arrangement communications between the lure and boat may be passed along a conductive fishing line or an independent line running parallel to a conventional fishing line. For example, an optic fibre could be used to tranfer information to and from the lure.

It is envisaged that a fisherperson on a boat could observe a global positioning system (GPS) and a sounder as the boat trolls an area. The GPS and sounder would give information regarding the location and depth and possibly species of fish. The lure could then be remotely controlled so that it is sent to the correct depth, so that it generates signals (visual, electrical and vibratory) representaive of the preferred prey of the species of marine predator identified, and so that it swims in a manner consistent with the preferred prey.

Similarly, the lure may be laterally steered to the location of the predatory fish. If the initially selected parameters prove unsuccessful in attracting a strike, the lure could be switched to generate an alternative signal, and/or different swimming action. In the event that the lure continues to be unsuccessful, it can be retrieved and a lure member mounted to change the appearance of the lure or, if a lure member was already being used, it can be de-mounted and an alternative lure member can be be mounted.

The lure may include environmental sensing means for capturing information regarding its speed through the water or its environment (eg topography, depth, temperature, ambient light) and transmission means for transmitting this information back to the boat or shore. For example, a fisherperson casting from shore may be able to build up a picture of the area they are casting into. Alternatively, a person fishing from a boat could locate thermoclines, currents etc.

In a preferred arrangement the lure further comprises sensor means for sensing the proximity of the marine predator. The sensor means may be a low power sonar device. Preferably, the transducer means is switched by the microchip between modes in response to the sensor means sensing the proximity of the marine predator. That is, if the lure is successful in attracting the marine predator to close proximity, the lure detects this and then emits appropriate signals representative of the prey becoming very excited. This information may also be communicated back to the boat whereby the fisherperson will be aware that a strike may be imminent.

Normally, the signal generated by the transducer means is indicative of prey and/or the feeding of other marine predators. Most preferably the signal is indicative of sick, distressed or injured prey of the marine predator.

In a preferred embodiment the transducer means,

circuit board and other more sensitive components may be adapted to break away from the remainder of the lure in response to a fish striking the lure. Thus the likelihood of damage to the sensitive components of the lure is reduced. In one embodiment, the hook is mounted to the lure member, and the lure housing breaks away from the lure member in response to a strike. The lure housing and lure may be interconnected by a line or trace and a reel and brake arrangement may be provided such that line/trace is unwound from the reel in response to a strike.

According to another aspect of the invention there is provided a method of attracting a marine predator including generating a signal representative of sick, injured or distressed prey of the marine predator.

Preferably, the signal is a recording of sick, injured or distressed prey of the marine predator. The signal may include vibrational and/or electrical components.

BRIEF DESCRIPTION OF THE FIGURES

In order that this invention may be more easily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the invention, wherein:-

FIG 1 is a series of three orthogonal views of a circuit board;

FIG 2 is a series of three orthogonal views of receiving means in the form of a ferrule;

FIG 3 is a series of three orthogonal views of a charging unit contact pin which is received in the ferrule during charging;

FIG 4 is a series of three orthogonal views of a rechargeable battery which drives the circuit board;

FIG 5 is a series of three orthogonal views of transducer means in the form of a piezoelectric member;

FIG 6 is a series of two orthogonal views of a

magnetic reed switch which suppresses generation of a signal by the piezoelelctric member when the battery is being charged;

FIG 7 is a series of two orthogonal views of the circuit board/ferrule/battery/piezoelectric member/reed switch assembly ("the unit") showing the ferrules about to receive the charging unit contact pin;

FIG 8 is a perspective view of the unit;

FIG 9 is an exploded view of the unit;

FIG 10 is a series of three perspective views of a solar/battery charging unit in various configurations and orientations;

FIG 11 is a schematic circuit diagram of the unit;

FIG 12 is an assembled and exploded view of the unit within the housing with insets showing detail of the bib and fin planing surface;

FIG 13 is a perspective view of a lure member about to be mounted on the housing to alter the outward appearance thereof;

FIG 14 is a longitudinal sectional view of the lure member showing a secondary transducer mounted in the lure member;

FIG 15 is a longitudinal sectional view of a housing showing liquid inlet means, liquid outlet means, valving means and fin planing surfaces;

FIG 16 is a perspective view a lure member about to be mounted on a housing; and

FIG 17 shows an alternative embodiment of the lure housing wherein the lure housing is adapted to seperate from the lure member in response to a strike.

BEST MODE OF PERFORMING THE INVENTION

Referring to FIG 1, there is shown a series of views of a circuit board 10 having eyelets 12 and piezoelectric pedestals 14.

Referring to FIG 2, there is illustrated ferrule 16 which, in use, is fixedly received in eyelet 12.

Referring to FIG 3, there is shown contact pin 18 of

the charging unit. Contact pin 18 is adapted to be received in ferrule 16 during charging.

Referring to FIG 4, there is illustrated rechargeable battery 20.

Referring to FIG 5, there is illustrated piezoelectric member 22 which, in use, is mounted on piezoelectric pedestals 14 and is powered by battery 20 to generate signals. The signal is switchable between digitisised recordings of a variety of prey of the marine predator.

Referring to FIG 6, there is illustrated a magnetic reed switch 24. Reed switch 24 is operable in response to the close proximity of a magnet.

Referring to FIG 7, there is illustrated the assembly of the circuit board 10, ferrule 16, battery 20, piezoelectric members 22 and magnetic reed switch 24 (the "unit").

Referring to FIG 8, there is illustrated a perspective view of the unit 26 minus ferrules 16. Antenna 28 is adapted to receive signals from remote control unit 30.

Referring to FIG 9, there is illustrated an exploded view of the unit. The unit is conveniently encased by piezo retainer cups 32 and thereafter housed in a housing of thr lure (not shown in FIG 9).

Referring to FIG 10, there is illustrated a series of three views of charging unit 34. Charging unit 34 includes contact pins 18 and magnet 36 which is adapted to actuate reed switch 24 when the lid of charging unit 34 is closed. Charging unit 34 also includes a battery compartment 42 which can supplement or substitute energy supplied by solar panels 43. Charging unit 34 is conveniently switchable between different charging modes (solar or battery) by virtue of switch 40.

In use, lure housing 38 which houses unit 26 is located in charging unit 34 by virtue of charging pins 18 being received in ferrules 16. Piezoelectric members 22 are normally energised by battery 20 and output a

vibratory signal indicative of bait or prey. However, when lure housing 38 is located in charging unit 34 and the lid of charging unit 34 is closed, magnet 36 activates reed switch 24 to suppress generation of signals by piezoelectric members 22. Battery 20 can then be re-charged by receiving charge from solar panel 43 or from batteries (not shown) located in battery compartment 42.

On completion of charging, lure housing 38 can be removed from charging pins 18 whereupon generation of the signal by piezoelectric members 22 is automatically resumed. Thus, it will be appreciated that charging unit 34 serves a dual function of being both a charger and a storage unit for the housing when it is not being used.

Lure housing 38 can only be received in charging unit 34 in one orientation to ensure that reverse polarity charging does not occur.

Referring to FIG 11, there is shown a schematic circuit diagram of the unit. Diodes are used to prevent discharge of the battery through electrolyte (salt water) disposed between the ferrules 16. As can be seen, antenna 47 enables external communication with the circuit board which is powered by the battery and controls the piezoelectric members. Data storage means digitally stores data representative of a variety of desired signals.

Referring to FIG 12, lure housing 38 is shown with bib 45 and planing fins 41. Antenna 28 is in electrical contact with loop antenna 44 which is strongly constructed and doubles as mounting points for hooks, traces and the like. The angle of attack of planing fin 41 can be controlled to control the swimming action and/or depth of the lure. Rudder-like planing surfaces can achieve the equivalent result laterally. In the embodiment illustrated, planing fin 41 is engaged by the teeth of rotatable sprocket 49 whereby the angle of attack can be controlled. The rotatable sprocket can be driven by the circuit board or can be directly linked to

generator means powered by relative movement through fluid.

Referring to FIG 13, there is illustrated a lure member 46 in the shape of a bait fish about to be mounted on lure housing 38. Lure member 46 is flexible and resilient to simulate the "feel" of the bait which it simulates. Loop antenna 44 of lure housing 38 is engaged by electrically conductive wire 48 of lure member 46. Conductive wire 48 achieves the dual function of facilitating mounting of lure member 46 to lure housing 38 and also enhances the receptive characteristics of loop antenna 44. Furthermore, conductive wire 48 can carry signals between lure housing 38 and tranducers mounted within lure member 46.

Referring to FIG 14, there is shown a longitudinal, sectional view of lure member 46. In this embodiment, lure member 46 includes a secondary transducer 50 located in the tail section lure member 46. Secondary transducer 50 may be powered by and may communicate with the components of lure housing 38 by virtue of conductive wire 48. Lure member 46 includes a resonating chamber 52 to enhance the acoustic output of secondary transducer 50. In another arrangement secondary transducer 50 may be a sonar device which captures data relating to the lure's environment. This data may be transmiitee to the circuit board and may be transmiited therefrom back to the fisherperson.

Referring to FIG 15, there is shown an alternative embodiment of lure housing 38 including valving means 54 and 58 controlling flow of fluid through lure housing 38. In the embodiment illustrated valving means 54 controls the flow of fluid between liquid inlet means 55 and liquid outlet means in the form of perforations 56 in the side wall of lure housing 38. In this embodiment planing fin 41 may be controlled by virtue of a gearing mechanism disposed intermediate the planing fin and valving means 54 which can be driven by fluid or actuated by the circuit board. The angle of attack of planing fin 41 may

be cyclically controlled whereby the lure cyclically swims through a range of depths. Alternatively, planing fin 41 may be independently controlled by circuit board 10.

With reference to FIG 16, there is illustrated an alternative lure member 60. In this arrangement lure housing 38 is inserted in the tail of lure member 60 which is in the form of a prawn or crayfish.

Referring to FIG 17 there is illustrated an alternative lure housing 38 wherein the lure housing includes a rotatable reel 62. A length of line/trace extends between the lure housing and the lure member which mounts the hook. As reel 62 is rotated, the length of line/trace between lure housing 38 and the lure member is decreased thereby drawing the lure member into a position where it is mounted on lure housing. The unwinding of the reel 62 is controlled by a brake, however the force of a fish hooking up on the lure member overcomes the resistence of the brake and line/trace is thereby fed out between the lure housing 38 and the lure member. Thus, the sensitive components of the system (housed in the lure housing) are removed from close proximity to the predatory fish and are thereby protected. In the preferred embodiment, the line/trace extending between the lure housing and lure member is continuous with the line/trace extending forwardly from the lure housing. This may be achieved by forming a loop in the line/trace and hooking it over peg 66 on reel 62. Alternatively, reel 62 may include an aperture through which the line/trace passes.

It will of course be realised that whilst the above has been given by way of an illustrative example of this invention, all such and other modifications and variations hereto, as would be apparent to persons skilled in the art, are deemed to fall within the broad scope and ambit of this invention as is herein set forth.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A lure for attracting a marine predator, the lure comprising:-

a housing; and

transducer means for generating a signal attractive to the marine predator.

2. A lure as defined in claim 1, wherein the lure further comprises rechargeable electrical storage means for powering the transducer means, and receiving means for receiving power from an external charger.

3. A lure as defined in claim 2, wherein the lure includes signal suppression means for suppressing generation of the signal when the rechargeable electrical storage means is being recharged.

4. A lure as defined in claim 3, wherein the signal suppression means includes a magnetic reed switch.

5. A lure as defined in claim, wherein the lure comprises fluid inlet means for entry of surrounding fluid into the lure and fluid outlet means for exit of said fluid, the lure further comprising valving means for selectively controlling the flow of fluid through the lure.

6. A lure as defined in claim 5, wherein the fluid inlet means is located adjacent a leading portion of the lure and the fluid outlet means is located rearwardly of the leading portion, and wherein the valving means periodically permits pulses of fluid to exit the fluid outlet means.

7. A lure as defined in claim 6, wherein the lure

further comprises variable volume fluid storage means intermediate the fluid inlet means and fluid outlet means and wherein the valving means selectively charges and discharges the variable volume fluid storage means.

8. A lure as defined in claim 7, wherein the variable volume fluid storage means is a bellows.

9. A lure as defined in claim 1, wherein the lure further comprises at least one lure member adapted to be mounted on the housing to thereby alter the outward appearance of the lure.

10. A lure as defined in claim 9, wherein the lure member resembles prey of the marine predator.

11. A lure as defined in claim 10, wherein the lure member is flexible.

12. A lure as defined in claim 1, wherein the lure further comprises a central processing unit for controlling the transducer means.

13. A lure as defined in claim 12, wherein the lure further comprises data storage means for storing data representative of signals generated by the transducer means.

14. A lure as defined in claim 13, wherein the transducer means is switchable between different modes wherein different signals are generated.

15. A lure as defined in claim 14, wherein the transducer means may be remotely switched between modes.

16. A lure as defined in claim 1, wherein the lure further comprises motion control means for selectively altering the swimming action of the lure, and wherein the lure further comprises a central processing unit for controlling the motion control means.

17. A lure as defined in claim 16, wherein the motion control means may be remotely switched between different swimming modes.

18. A lure as defined in claim 1, wherein the lure further comprises sensor means for sensing the proximity of the marine predator.

19. A lure as defined in claim 18, wherein the transducer means is switched between modes in response to the sensor means sensing the proximity of the marine predator.

20. A lure as defined in claim 16, wherein the lure further comprises sensor means for sensing the proximity of the marine predator, and wherein the motion control means is switched between modes in response to the sensor means sensing the proximity of the marine predator.

21. A lure as defined in claim 1, wherein the transducer means generates an electrical signal representative of the electrical signature of prey of the marine predator.

22. A lure as defined in claim 1, wherein the transducer means includes a piezo-electric element which generates a signal representative of vibrations of prey of the marine predator.

23. A lure as defined in claim 21 or 22, wherein the signal is indicative of sick, distressed or injured prey of the marine predator.

24. A lure as defined in claim 21 or 22, wherein the signal is indicative of the feeding of other marine predators.

25. A lure as defined in claim 21 or 22, wherein the signal is a digitised recording of prey of th emarine predator.

26. A lure as defined in claim 1, wherein the lure includes environmental sensing means to sense ambient conditions around the lure, and transmission means for transmitting data relating to the sensed conditions to the fisherperson.

27. A method of attracting a marine predator including generating a signal representative of sick, injured or distressed prey of the marine predator.

28. A method of attracting a marine predator as defined in claim 27, wherein the signal is a recording of sick, injured or distressed prey of the marine predator.

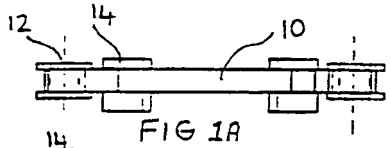


FIG 1A

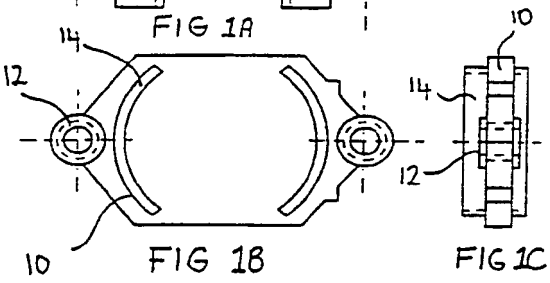


FIG 1B FIG 1C

FIG 2A FIG 2B FIG 2C

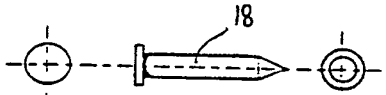


FIG 3A FIG 3B FIG 3C

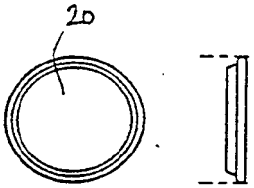


FIG 4A FIG 4B

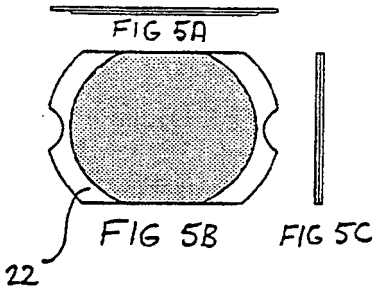


FIG 5B FIG 5C

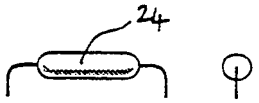


FIG 6A FIG 6B

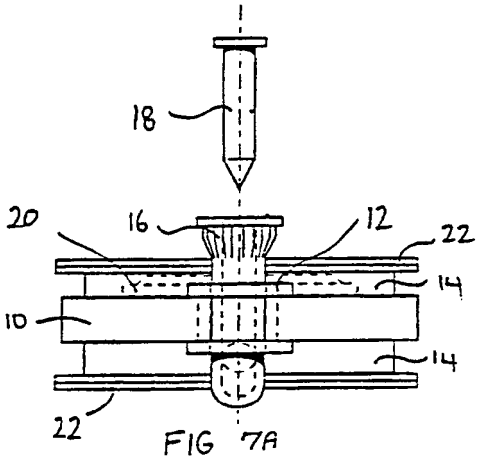


FIG 7A

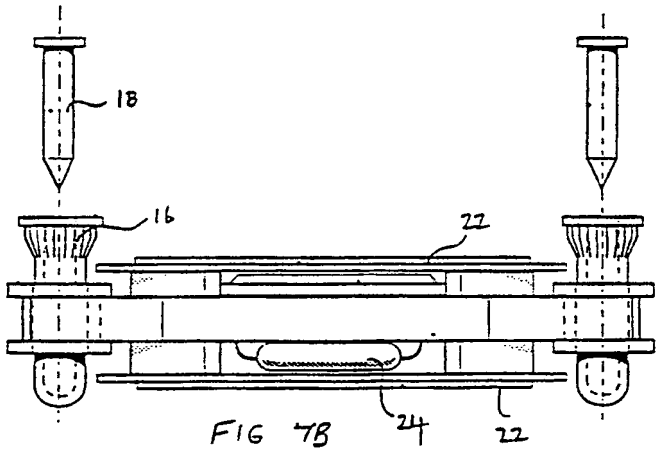


FIG 7B

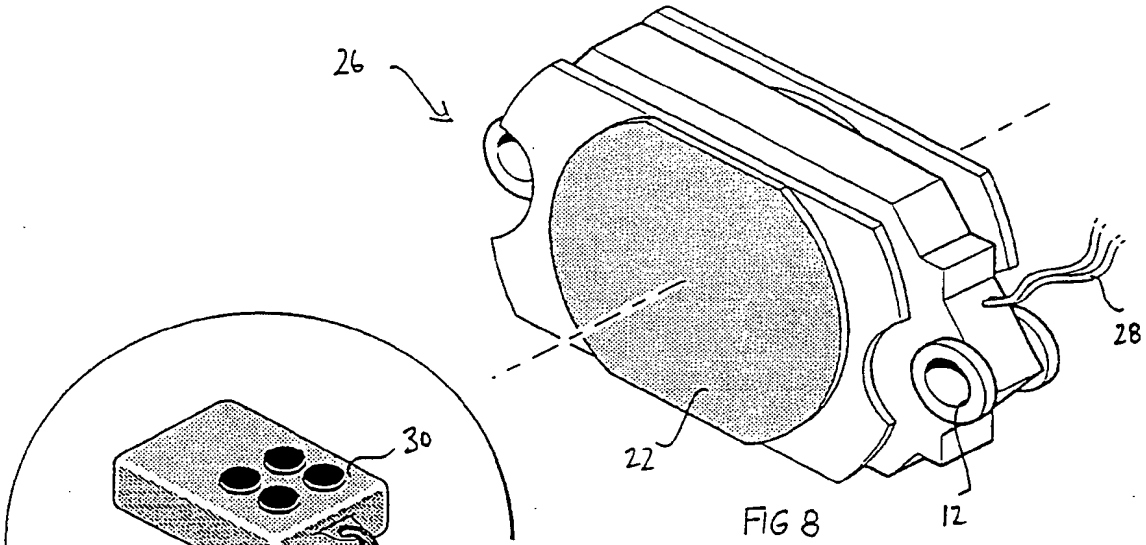


FIG 8

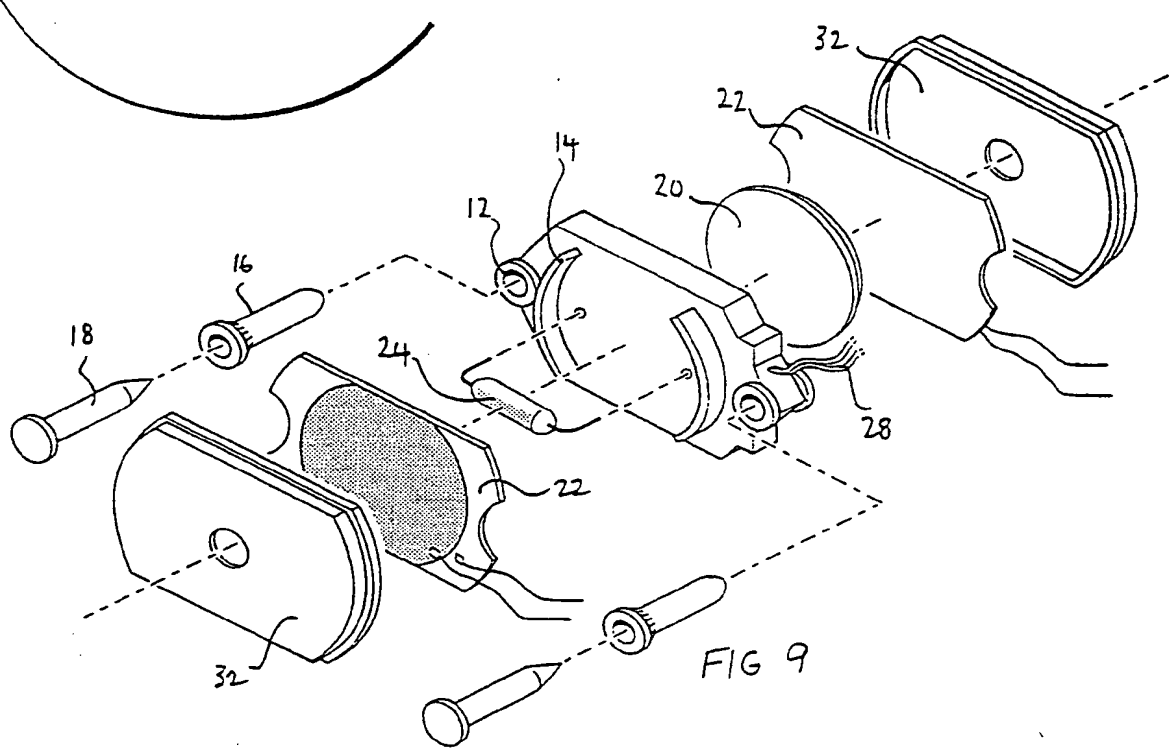


FIG 9

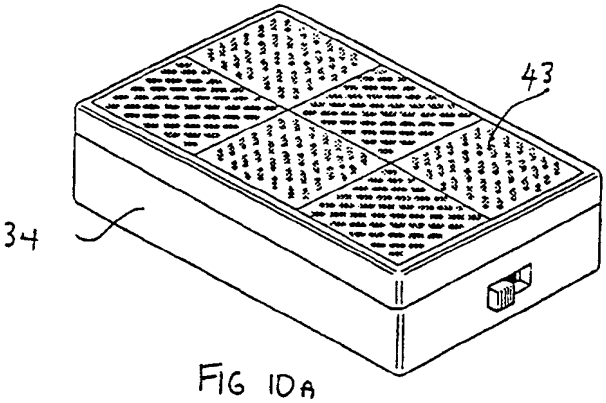


FIG 10A

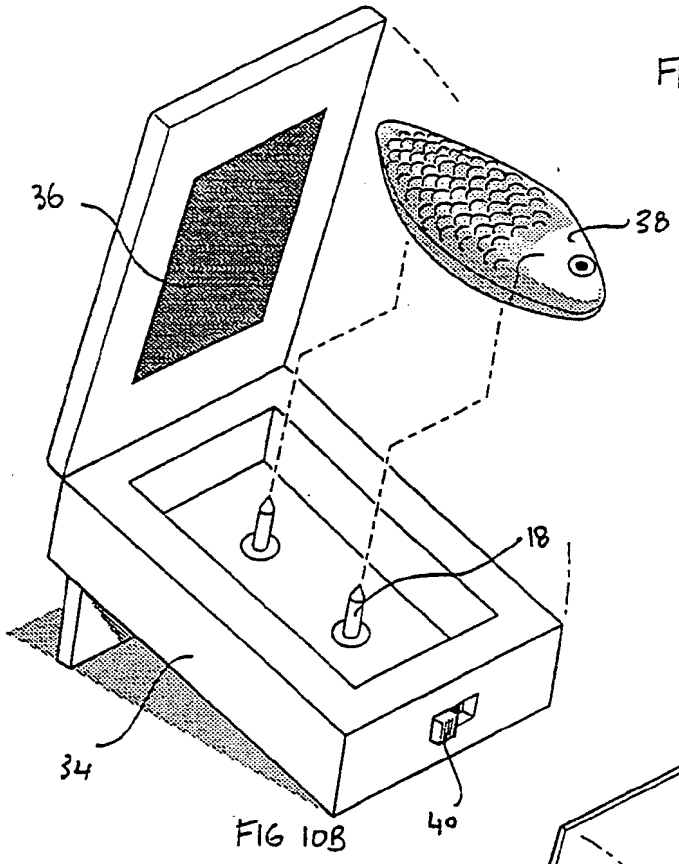


FIG 10B

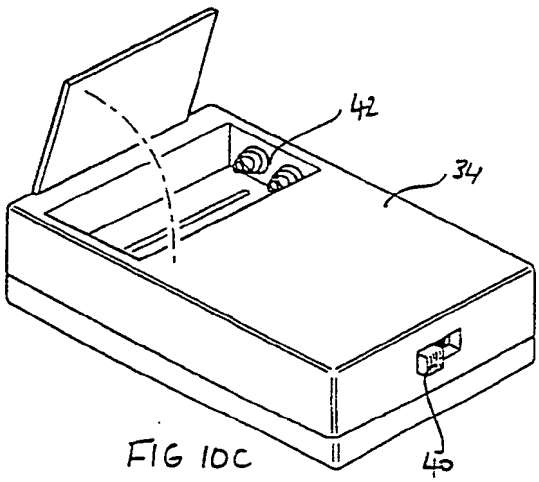


FIG 10C

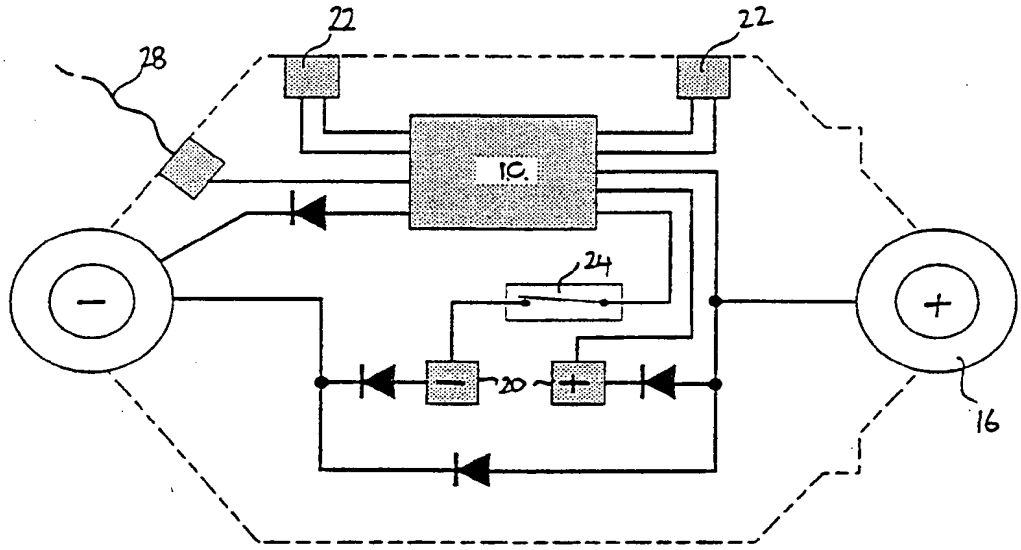


FIG 11

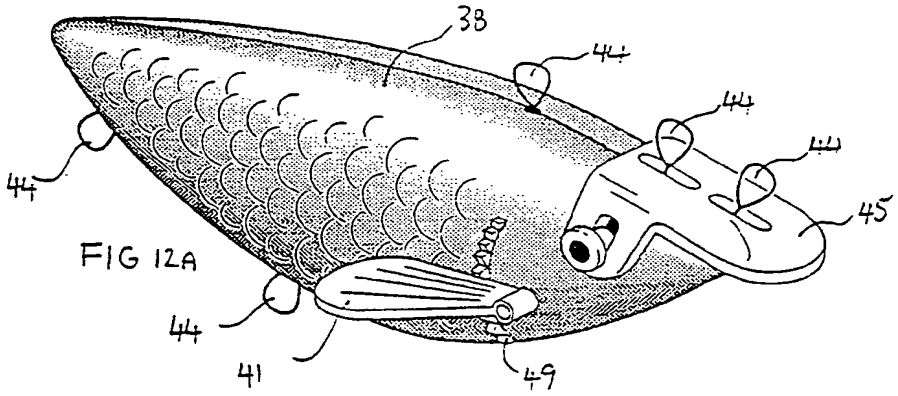


FIG 12A

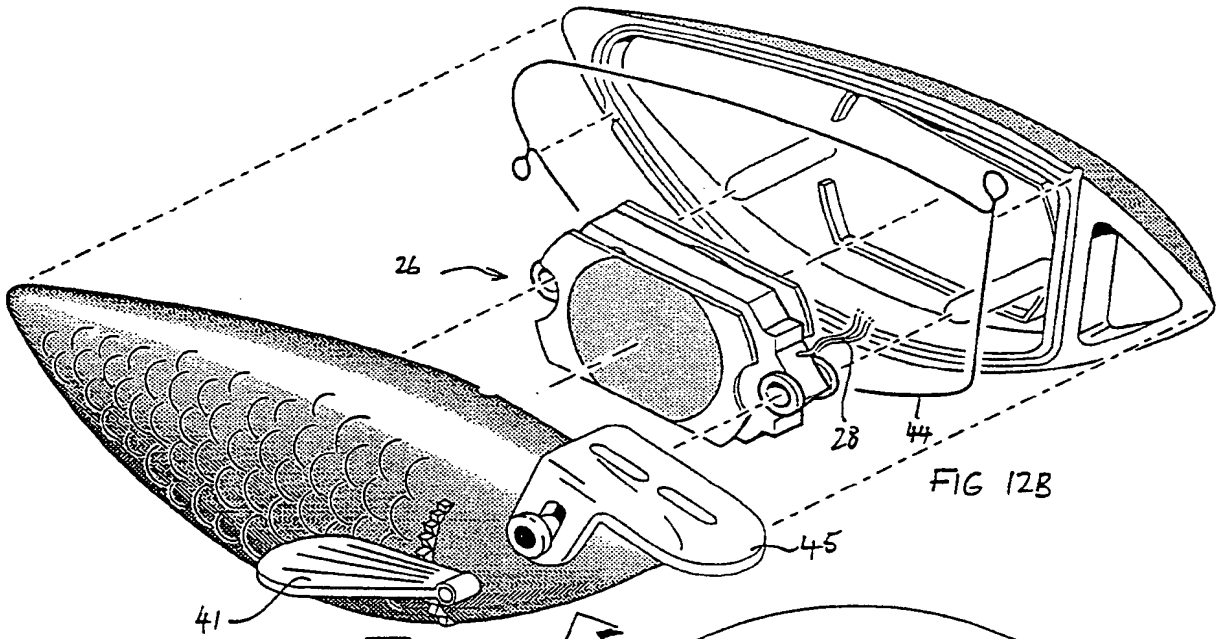
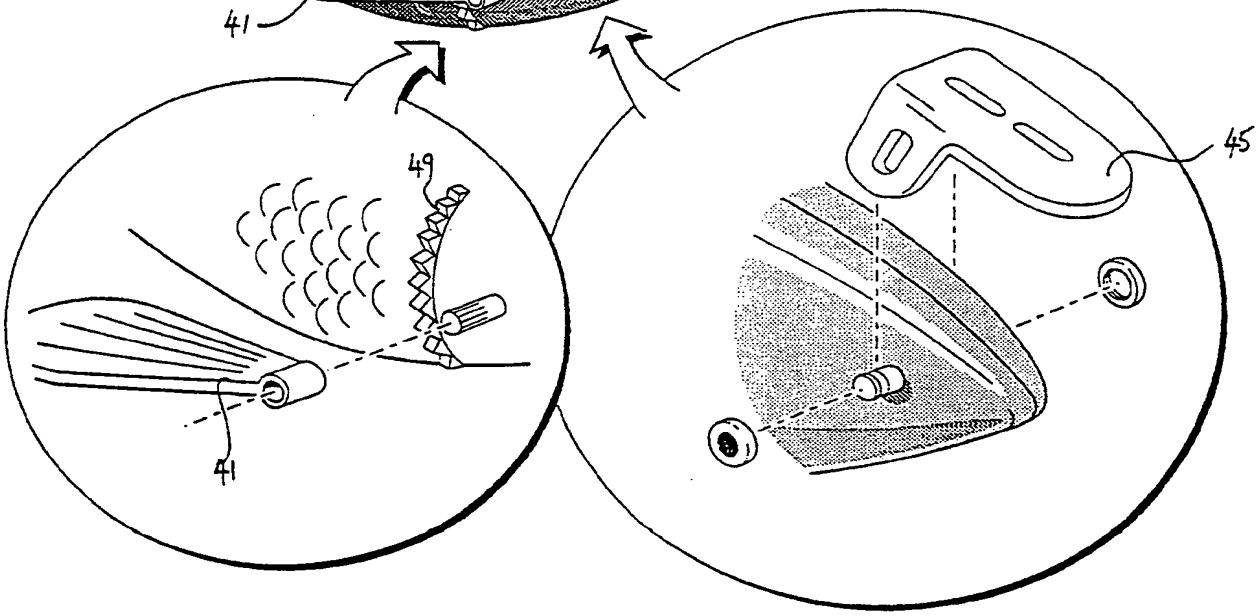


FIG 12B



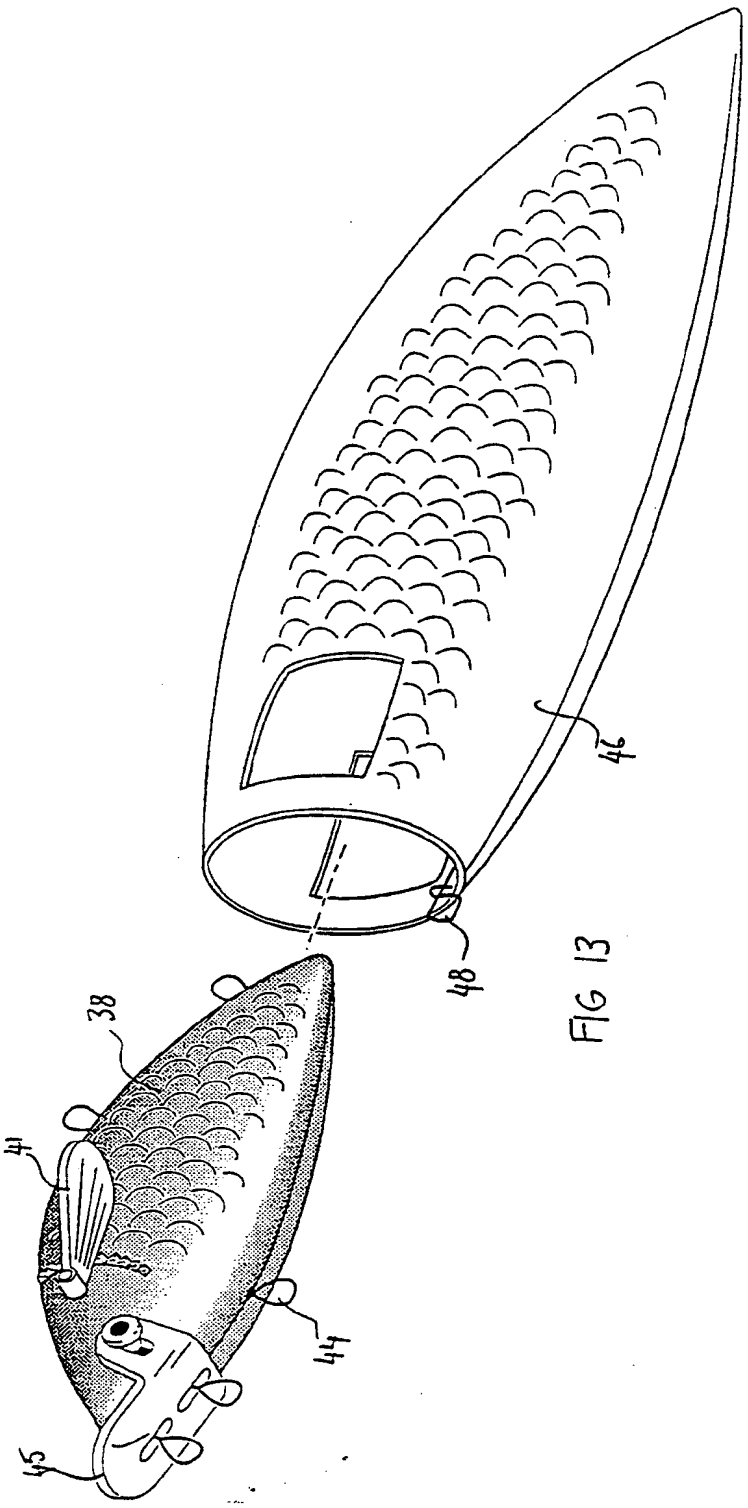


FIG 13

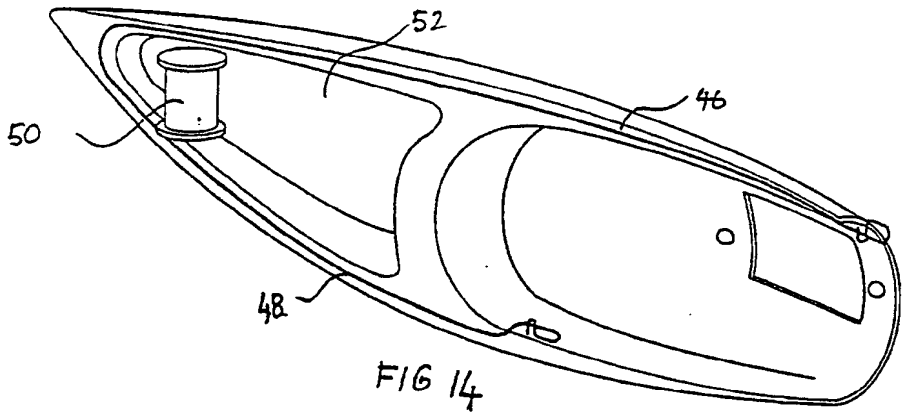


FIG 14

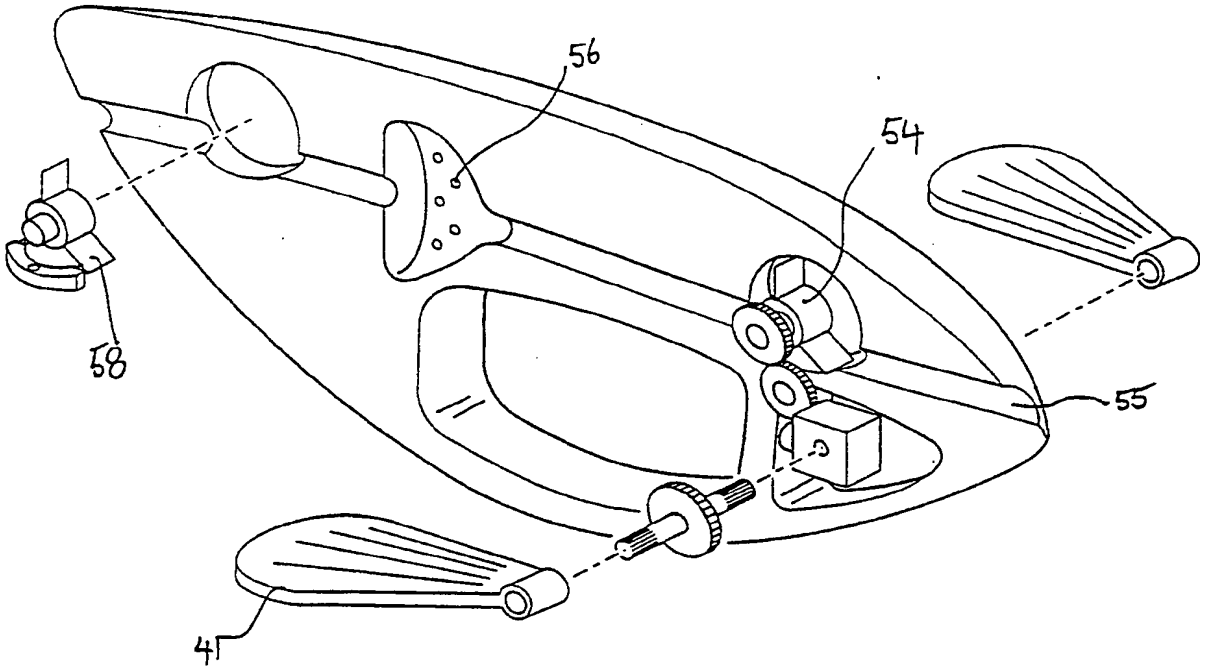


FIG 15

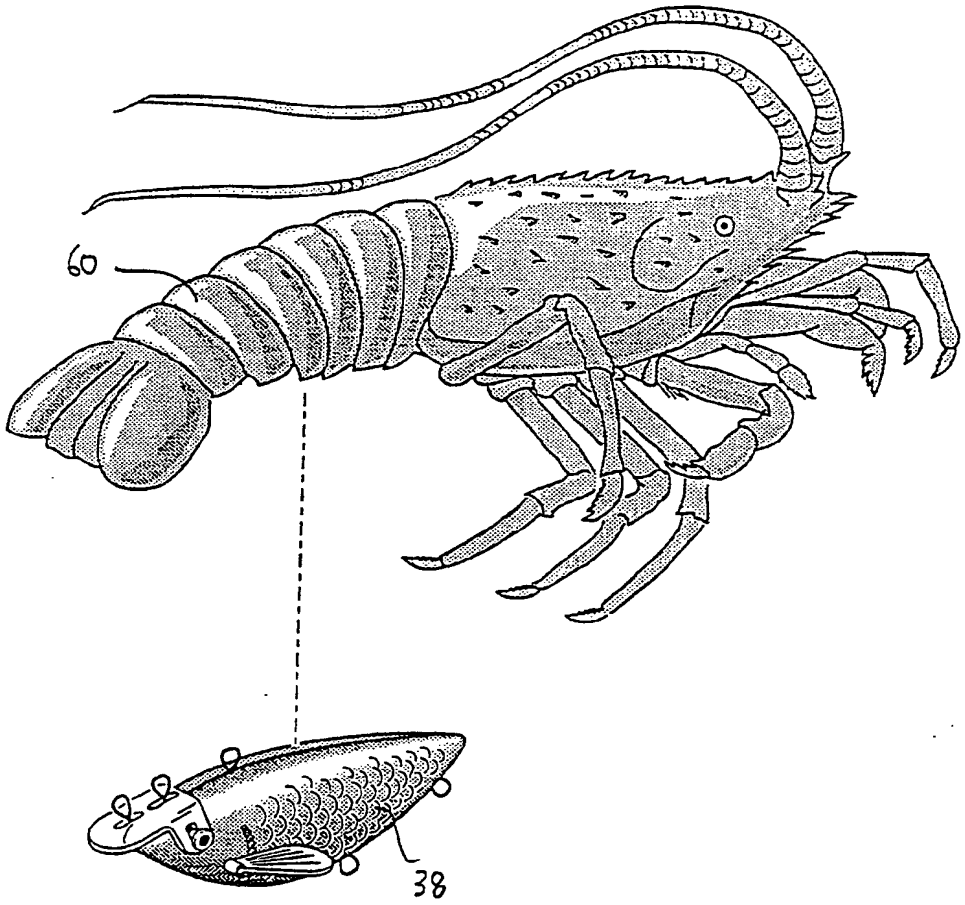


FIG 16

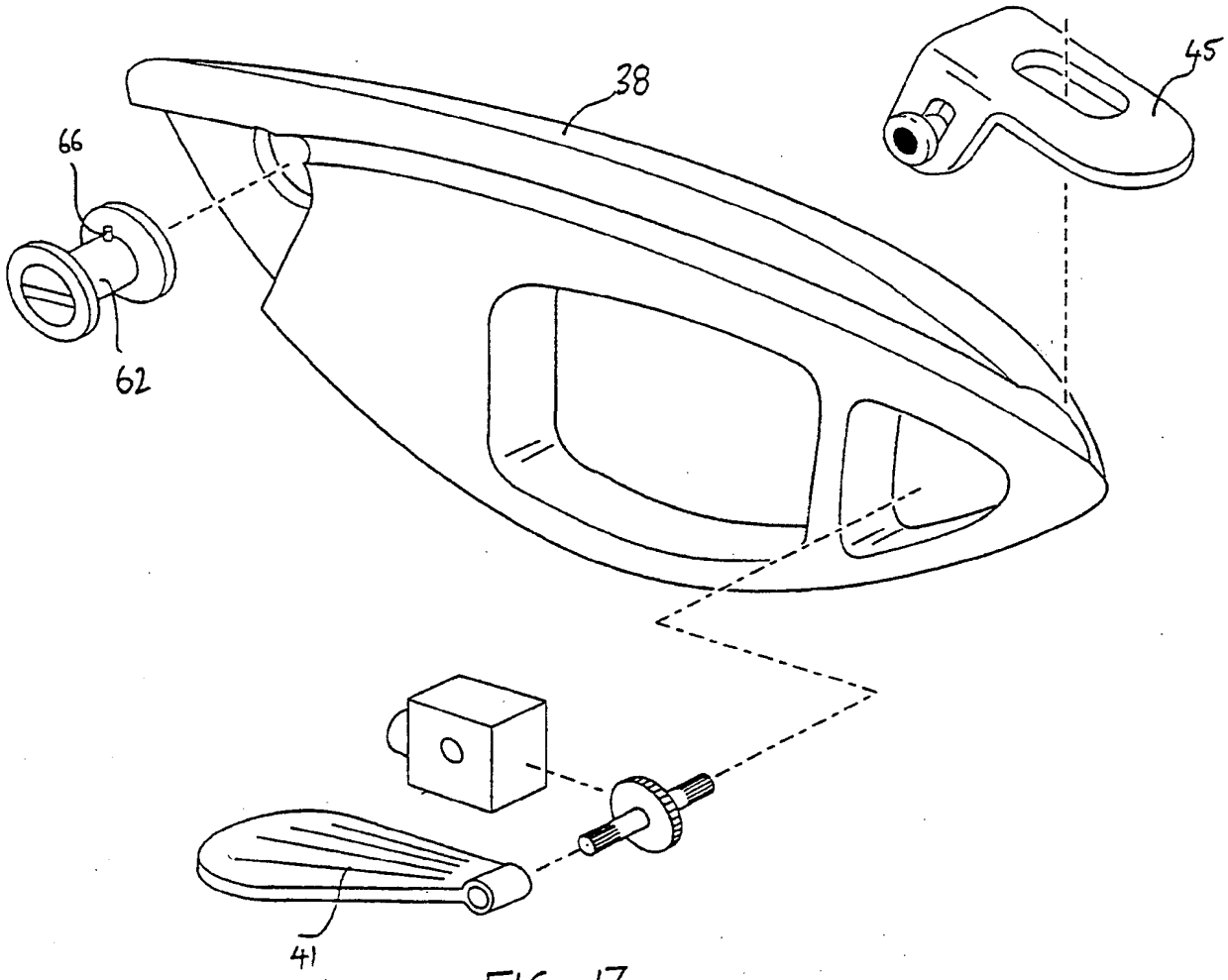


FIG 17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 94/00430

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.[6] A01K 85/00, 85/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC A01K 85/00, 85/01

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC as above

Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	US,A, 4819361 (BOHARSKI) 11 April 1989 (11.04.89) Column 1 lines 10-20; claims 1 and 2: Fig 1	1
X	US,A, 4805339 (FUENTES et al) 21 February 1989 (21.02.89) Column 3 lines 20-50, claim 1; Fig 2	1
X	US,A, 4960437 (WATSON et al) 2 October 1990 (02.10.90) Column 2 lines 25-49; Fig 1	1
X	AU,A, 30929/89 (BHASKARA M.L. RAO) 7 September 1989 (07.09.89) See entire document	1

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 September 1994 (30.09.94)	- 14 October 1994 (14.10.94)

Name and mailing address of the ISA/AU	Authorized officer
AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA	M.E. DIXON
Facsimile No. 06 2853929	Telephone No. (06) 2832194

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
X	AU,A, 85657/91 (WANG) 2 July 1992 (02.07.92) See entire document	1
X	US,A, 5224285 (KAMIN) 6 July 1993 (06.07.93) See claim 1	27
X	Derwent Abstract Accession No. 94-198229/24, Class P14, SU,A, 1805846 (ZHURAVLEV V.V.) 30 March 1993 (30.03.93)	27

INTERNATIONAL SEARCH REPORT

Information on patent family membe

International application No.
PCT/AU 94/00430

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	4960437	US	5237771				
AU	30929/89	EP	331518	JP	2079924	US	4959919
AU	85657/91	US	3562523	US	4043932	CA	2054241
		EP	493330	US	5052145	DE	2530487
							END OF ANNEX